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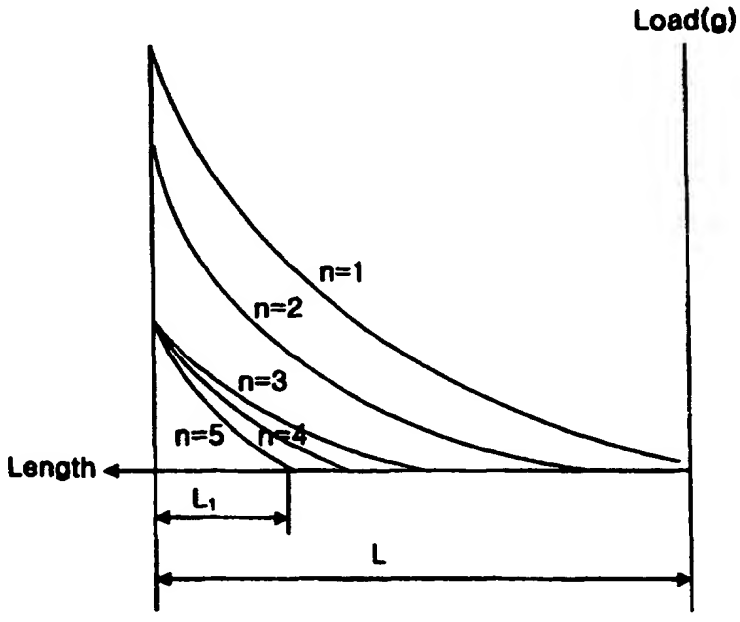
(54) Title: A WARP KNIT HAVING AN EXCELLENT TOUCH, AND A PROCESS OF PREPARING THE SAME



(57) Abstract: The present invention relates to a warp knit having excellent touch and a process of preparing such a warp knit. The present invention provides a warp knit consisting of a front surface layer and a rear surface layer, the front surface layer consisting of ultra fine yarn with mono-filament denier of 0.01 ~ 0.9 denier, the rear surface layer consisting of synthetic yarn or high shrinkage yarn with mono-filament denier of 1 ~ 5 denier, wherein the recovery rate of elongation in the directions of wale and course is 8 ~ 30 %. The warp knit according to the present invention is used to manufacture artificial leathers or ladie's clothes.

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A WARP KNIT HAVING AN EXCELLENT TOUCH, AND A PROCESS OF PREPARING THE SAME

TECHNICAL FIELD

The present invention relates to a warp knit having excellent touch and a process of preparing such a warp knit.

More particularly, the present invention relates to a warp knit with softness and draping property due to its very fine structure and thus useful for materials of artificial leathers or ladies' clothes, and a process of preparing such a warp knit.

BACKGROUND ART

If a fiber becomes fined, its bending strength becomes weakened. Accordingly, since fabrics produced with ultra fine fiber have very soft touch, researches in connection with producing such ultra fine fiber on a commercial scale are developing very actively. Also, development of the technology which is capable of producing synthetic yarn extremely finely leads to great improvement of the value of the goods of sensitive materials for clothes.

Generally, a process of preparing ultra fine fiber is divided into

means of the two components extraction type spinning process is applied to a warp knit, warping property, knitting property and touch of the warp knit are good; however, density in the structure of the warp knit is loosened and thus appearance of the warp knit is poor since the extraction component is extracted at the following processing step for producing in ultra fine fiber.

Producing goods with ultra fine fiber are developing in variety in connection with textile applications. However, producing goods with ultra fine fiber are not developing connection with knitting applications since the poor warping property and the several drawbacks generated at the following processing step as mentioned above.

Accordingly, it is an object of the present invention to prepare a warp knit, which has excellent touch, shape stability, and appearance, and thus is suitable for materials of ladies' clothes, with good warping property and knitting property.

DISCLOSURE OF THE INVENTION

The present invention provides a warp knit which has excellent touch, shape stability, flexibility, and appearance, and thus is suitable for materials of ladies' clothes. The present invention also provides a process

The inventor of the present application accomplished the present invention, taking notice of the fact that the selection and the combination of the materials in designing structure is very important in order to prepare polyester warp knit which is as soft as natural suede and which has excellent appearance as well as excellent warping property and knitting property.

Fist of all, the present invention uses a composite fiber consisting of fiber formation components of 0.01~0.9 denier and extraction component as a yarn of the front surface layer. If the extraction component is removed from the composite fiber, the fiber formation component with mono-filament denier of 0.01~0.9 denier is only remained. If the mono-filament denier of the yarn at the front surface layer is more than 0.9 denier, its soft touch is poor and the writing effect is not revealed. If the mono-filament denier of the yarn at the front surface layer is less than 0.01 denier, its soft touch is maintained, but its appearance is poor since the raised fiber are omitted or entangled due to friction.

It is preferable that the density of the yarn at the front surface layer is increased in order to improve the touch of the warp knit. It is possible for increasing the density of the yarn at the front surface layer to reduce the content of extraction component in the composite fiber during the manufacturing stage ; however, it is curbed technically in spinning process,

15~50 % and the stress of the heat shrinkage of 0.2 g/d or more. If the shrinkage rate of boiling water is less than 15 %, it is not possible to increase the density of ultra fine yarn, which are the yarn of the front surface layer, and thus the touch is poor since the shrinkage is extremely low. If the shrinkage rate of boiling water is more than 50 %, it is possible to increase the density of ultra fine yarn, which are the yarn of the front surface layer; however, it is hard to control the process width of the finished warp knit since the shrinkage is extremely high. Furthermore, if the stress of the heat shrinkage is less than 0.2 g/d, the stress between the structural points is not overcome even if the shrinkage rate of boiling water is high, and therefore sufficient shrinkage is not provided.

Copolyester is preferably used as the high shrinkage yarn as mentioned above. Co-polymer components include bisphenol-A, polyethyleneglycol, isophthalic acid or the like. However, the present invention is not limited to the co-polymer components as described above.

Also, the present invention use a synthetic yarn with mono-filament denier of 1~5 denier as a yarn of the rear surface layer. The synthetic yarn is polyester filament or polyamide filament, more preferable polyester filament. If the mono-filament denier of the yarn at the rear surface layer is less than 1 denier, it is impossible to add proper repulsion

thereby the extraction component is removed from the composite fiber. After that, the warp knit is dyed, buffered and finally heat-treated.

As the present invention use the extraction typed composit fiber as the yarn of the front surface layer, the warping and knitting property is excellent. And as the extraction component of composit fiber is extracted in after-process, the yarn of the front surface layer is fined. As result, the warp knit of the present invention has excellent touch and writing effect.

Meanwhile the warp knit of the present invention is composed densely out of ultra fine yarn with mono-filament denier of 0.01~0.9 denier, whereby its touch and appearance are very excellent. Especially, as the warp knit of the present invention includes the rear surface layer consisting of high shrinkage yarn with 15~50% of shrinkage rate of boiling water, the density of the ultra fine yarn at the front surface layer is higher, and recovery rate of elongation of a warp knit in the directions of the wale and the course is 8~30 %, which represents excellence. Also, as the warp knit of the present invention includes 15~60% in weight of the rear surface layer consisting of the high shrinkage yarn, the touch and the draping property of the warp knit are excellent.

Also, the warp knit of the present invention , used the synthetic yarn

If more than eight specialists determine that the warp knit has poor draping property, it is poor.

Writing effect

Writing effect of the warp knit is evaluated from the sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has writing effect, it is excellent. If five~seven specialists determine that the warp knit has writing effect, it is ordinary. If more than eight specialists determine that the warp knit has poor writing effect, it is poor.

Appearance

Appearance of the warp knit is evaluated from the sensitive examination by ten specialists. If more than eight specialists determine that the warp knit has good appearance, it is excellent. If five~seven specialists determine that the warp knit has good appearance, it is ordinary. If more than eight specialists determine that the warp knit has poor appearance, it is poor.

Shrinkage rate of boiling water

Shrinkage rate of boiling water is measured according to JIS-L-1073 methods.

Recovery rate of elongation (%)

excellent. If the stop times/hour is one or two, it is ordinary. If the stop times/hour is more than 3 times, it is poor. The stop times/hour of warping machine is calculated by dividing the total stop times of warping machine in warping the yarn of 9kg into total warping time.

Knitting property

Knitting property is evaluated by checking the stop times/hour of knitting machine due to yarn defect. If the stop times/hour is naught, it is excellent. If the stop times/hour is one or two, it is ordinary. If the stop times/hour is more than 3 times, it is poor. The stop times/hour of knitting machine is calculated by dividing the total stop times of knitting machine in a day into 24hour.

Raising property

Raising property of warp knit is evaluated from the sensitive examination. If the raising of warp knit is finished well by passing the raising machine 8 times at speed of 15m/minute, it is excellent. If the raising of warp knit is finished well by passing the raising machine 10 times at speed of 15m/minute, it is ordinary. If the raising of warp knit is finished well by passing the raising machine more then 10 times at speed of 15m/minute, it is poor.

boiling water of 28%(high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 26% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Example 2

At first, prepare the raw warp knit with density of 23C/CM by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.07 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using

extraction component, as a yarn of the front surface layer, and then using copolyester yarn with mono filament of 2.5 denier and shrinkage rate of boiling water of 28%(high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 55% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Example 4

At first, prepare the raw warp knit with density of 23C/CM by using a extraction type composite fiber, which the fiber formation component is polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and

copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 0.05 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using copolyester yarn with mono filament of 0.5 denier and shrinkage rate of boiling water of 40%(high shrinkage yarn) as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 48% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Comparative Example 2

At first, prepare the raw warp knit with density of 23C/CM by using a extraction type composite fiber, which the fiber formation component is

polyethyleneterephtalate and the extraction component is copolyester copolymerized with 7 mole% of dimethylene sulfurisophthalic sodium, and which is prepared 1.3 denier of ultra fine yarn after removing the extraction component, as a yarn of the front surface layer, and then using polyester yarn with mono filament of 20 denier as a yarn of the rear surface layer. At this time, content of the yarn of the rear surface layer is 42% in weight to the total weight of processed warp knit. Next, treat the manufactured raw warp knit by raising machine untill the shrinkage of the warp knit is reached 50%. And then, after heating the warp knit at 190℃ preliminarily, dipping the warp knit in NaOH solution(1% concentration) during 30 minutes at 98℃ in other to remove the extraction component of composite fiber. And then prepare a processed warp knit by dyeing(with disperse dyes), buffing and heating at 180℃ finally the above mentioned warp knit. And then, evaluate the properties of the processed warp knit as above mentioned methods. The results of evaluation were indicated in Table 1.

Comparative Example 4

Except using the ultra fine polyester yarn with mono filament of 0.04 denier, made by direct spinning, as the yarn of the front surface layer,

WHAT IS CLAIMED IS:

1. A warp knit having excellent touch, characterized in that ; consist of a front surface layer and a rear surface layer, the front surface layer consisting of ultra fine yarn with mono-filament denier of 0.01~0.9 denier, the rear surface layer consisting of synthetic yarn or high shrinkage yarn with mono-filament denier of 1~5 denier, wherein the recovery rate of elongation in the directions of wale and course is 8~30 %.

2. The warp knit having excellent touch as claimed in claim 1, wherein the ultra fine yarn is polyester or polyamide.

3. The warp knit having excellent touch as claimed in claim 1, wherein content of the ultra fine yarn constituting the front surface layer is 40~85 % in weight of the total weight of the processed warp knit.

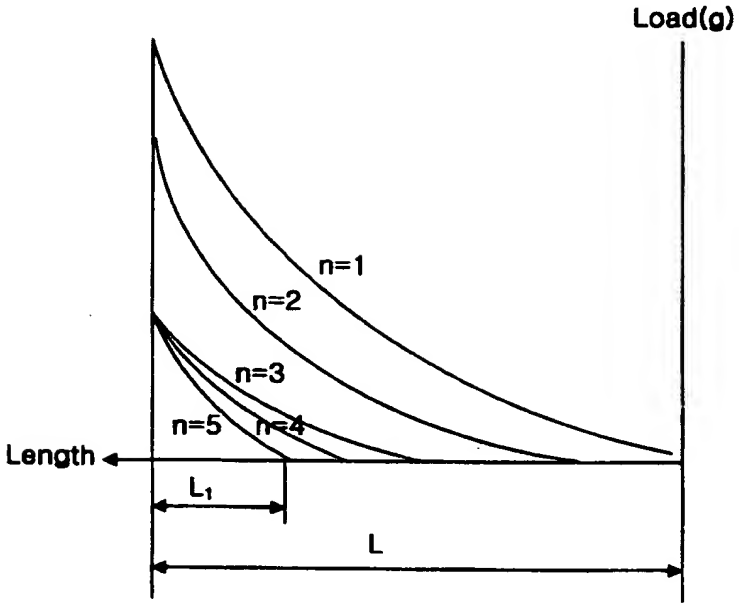
4. The warp knit having excellent touch as claimed in claim 1, wherein content of the high shrinkage yarn constituting the rear surface layer is 15~60 % in weight of the total weight of the processed warp knit.

5. The warp knit having excellent touch as claimed in claim 1, wherein the high shrinkage yarn is co-polyester yarn with 15~50% of shrinkage rate in boiling water.

6. The warp knit having excellent touch as claimed in claim 1,

DRAWING

FIG 1



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR00/01202

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 D04B 1/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimun documentation searched (classification system followed by classification symbols)

IPC7 D04B

Documentation searched other than minimun documentation to the extent that such documents are included in the fileds searched

KR IPC AS ABOVE
JP IPC AS ABOVE

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search trerms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR2000-13798 A(JANG) MAR. 06, 2000 (FAMILY NONE) see the whole document	1-8
X	KR95-3509 A(WHA) FEB. 17, 1995 (FAMILY NONE) see the whole document	7-8
A	JP7-207551 A(DAKAI) AUG. 08, 1995 (FAMILY NONE) see the whole document	1-8
A	JP7-243158 A(BARATO) SEP.19, 1995 (FAMILY NONE) see the whole document	1-8

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
02 FEBRUARY 2001 (02.02.2001)	02 FEBRUARY 2001 (02.02.2001)

Name and mailing address of the ISA/KR	Authorized officer
Korean Industrial Property Office Government Complex-Taejon, Dunsan-dong, So-ku, Taejon Metropolitan City 302-701, Republic of Korea Facsimile No. 82-42-472-7140	CHO, Sung Ho Telephone No. 82-42-481-5615

Form PCT/ISA/210 (second sheet) (July 1998)

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference *(if desired) (12 characters maximum)*

Box No. I TITLE OF INVENTION

A WARP KNIT HAVING AN EXCELLENT TOUCH, AND A PROCESS OF PREPARING THE SAME

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State(that is, country) of resicence if no State of residence is indicated below.)*

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☐ This person is also inventor.

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This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

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This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only*(if this check-box is amred, do not fill in below)*

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State*(that is, country)* of residence: KR

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

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Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common resentative

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Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

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This person is:
- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only*(if this check-box is amred, do not fill in below)*

State*(that is, country)* of nationality: KR

State*(that is, country)* of residence: KR

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State(that is, country) of resicence if no State of residence is indicated below.)*

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Republic of Korea

This person is:
- ☐ applicant only
- ☒ applicant and inventor
- ☐ inventor only*(if this check-box is amred, do not fill in below)*

State*(that is, country)* of nationality: KR

State*(that is, country)* of residence: KR

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This person is:
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- ☐ inventor only*(if this check-box is amred, do not fill in below)*

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This person is:
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- ☐ applicant and inventor
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☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

Box No. V DESIGNATION OF STATES

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Regional Patent

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- ☐ **OA** **OAPI Patent:** **BF** Burkina Faso, **BJ** Benin, **CF** Central African Republic, **CG** Congo, **CI** Cote d'Ivoire, **CM** Cameroon, **GA** Gabon, **GN** Guinea, **GW** Guinea-Bissau, **ML** Mali, **MR** Mauritania, **NE** Niger, **SN** Senegal, **TD** Chad, **TG** Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT*(if other kind of protection or treatment desired, specify on dotted line)*

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Box No. VI PRIORITY CLAIM ☐ Further priority claims are indicated in the Supplement Box.

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is: national application: country	regional application:* regional Office	international application: regional Office
item(1) 16 December 1999 (16, 12, 1999)	1999-58119	KR		
item(2) 19 September 2000 (19, 09, 2000)	2000-54839	KR		
item(3) 19 September 2000 (19, 09, 2000)	2000-54840	KR		

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office)* identified above as item(s):

** Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplementary Box at least one country party to the Paris convention for the Protection of Industrial Property for which that earlier application was filed(Rule 4.10(b)(ii) See Supplemental Box.*

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority(ISA) *(if two or more International Searching Authorities are competent to carry the international search, indicate the Authority chosen, the two-letter code may be used):*

ISA/ KR

Request to use the results of earlier search; reference to that search*(if an earlier search has been carried out or requested from the International Searching Authority):*

Date*(day/month/year)* Number Country*(or regional Office)*

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following **number of sheets**:

request	:	4
description(excluding sequence listing part)	:	15
claims	:	2
abstract	:	1
drawings	:	1
sequence listing part of description	:	0
Total number of sheets	:	23

This international application is accompanied by the item(s) marked below:

1. ☒ fee calculation sheet
2. ☒ separate signed power of attorney
3. ☐ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☐ priority document(s) identified in Box No. VI as item(s)
6. ☐ translation of international application into(language)
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer reader form
9. ☐ other*(specify)* :

Figure of the drawings which should accompany the abstract:

Language of filing of the international application: KOREAN

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs(if such capacity is not obvious from reading the request).

CHO, HWAL RAI

1. Date of actual receit of the purported international application :

2. Drawings:
☐ received:
☐ not received:

3. Corrected date of actual receit due to later but timely received papers or drawings completing the purported international application :

4. Date of timely receit of the required corrections under PCT Article 11(2) :

5. International Searching Authority (if two or more are competent) : ISA/

6. ☐ Transmittal of search copy delayed until search fee is paid

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

This sheet is not part [redacted] does not count as a sheet of the interna[redacted] application

PCT

FEE CALCULATION SHEET

Annex to the Request

For receiving Office use only

International application No.

Date stamp of the receiving Office

Applicant's or agent's file reference

Applicant KOLON INDUSTRIES, INC. et al

CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE ..... 45,000 T

2. SEARCH FEE ..... 150,000 S

International search to be carried out by Korean Patent Office

(if two or more International Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search)

3. INTERNATIONAL FEE

Basic Fee

The international application contains 23 sheets.

first 30 sheets 464,100 b1

____ remaining sheets x ____ additional amount = b2

Add amounts entered at b1 and b2 and enter total at B ..... 464,100 B

Designation Fees

The international application contains 9 designations.

8 number of designation fees payable *(maximum 8)* x 100,000 amount of designation fee = 800,000 D

Add amounts entered at B and D and enter total I ..... 1,264,100 I

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D)

4. FEE FOR PRIORITY DOCUMENT *(if applicable)* ..... P

5. TOTAL FEES PAYABLE ..... 1,459,100 TOTAL

Add amounts entered at T, S, I and P, and enter total in the TOTAL box

☐ The designation fees are not paid at this time.

MODE OF PAYMENT

☐ Authorization to charge deposit account(see below)	☐ bank draft	☐ coupons
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See Notes to the fee calculation sheet

PTO 03-2083

CY=KR DATE=20000306 KIND=A
PN=2000-0013798

METHOD OF MANUFACTURING MICROFIBER WARP-KNIT FABRIC
[GUHKSEH-SEOMYU GYEONGPYEONJI-UHYI JEHJEO BANGBEOP]

Jang, Seon & Ha

UNITED STATES PATENT AND TRADEMARK OFFICE
Washington, D.C. March 2003

Translated by: FLS, Inc.

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APPLICANT	(71):	DAEWOO CO, LTD.
DESIGNATED CONTRACTING STATES	(81):	
TITLE	(54):	METHOD OF MANUFACTURING MICROFIBER WARP-KNIT FABRIC
FOREIGN TITLE	[54A]:	GUHKSEH-SEOMYU GYEONGPYEONJI-UHYI JEHJEO BANGBEOP

ABSTRACT

The present invention relates to a method of manufacturing warp-knit fabric utilizing microfibers that possess such merits as vapor permeability and flexibility and that have excellent surface texture, drapability and tear strength. It aims to provide a method of manufacturing warp-knit fabric wherein a warp is knitted to form a warp-knit fabric, then undergoes finishing, characterized by blending extraction-type polyester fibers, whose single-fiber fineness can be microfiberized to less than 0.07 denier, with yarns, whose single-fiber fineness is 15-30 denier, and multifilaments, whose single-fiber fineness is 2-3 denier, to knit the warp; and by napping the surface before applying heat of a set temperature and, after pre-setting, extracting said polyester fibers' extract component to finish.

SPECIFICATION

Detailed Description of the Invention

Objective of the Invention

Field of the Invention and Existing Art in the Field

The present invention relates to a new method of manufacturing microfiber warp-knit fabric; more specifically, it relates to a method of manufacturing microfiber warp-knit fabric that not only is soft and of excellent drapability, but whose tear strength is also excellent.

Generally, fabrics that use microfibers are widely employed for apparel because, aside from their soft surface texture, they also possess such merits as a subtle and unique gloss effect and heat retention.

Methods of manufacturing microfibers may be classified into three types: direct spinning, split-type bicomponent spinning and extraction-type bicomponent spinning. The possible fineness of microfibers manufactured by direct spinning is about 0.3-0.5 denier, that by split-type bicomponent spinning about 0.2 denier, and in contrast that by extraction-type bicomponent spinning may be as much as 0.001-0.05 denier.

Microfibers ordinarily used in the manufacture of woven fabric or artificial suede are extraction-type microfibers. In the case of woven fabric employing extraction-type microfibers, because there is the drawback that after extraction of the extract component, the tear strength of the woven fabric declines and its strength weakens, it is woven by blending microfibers with high-shrinkage fibers, and examples of woven fabrics thus manufactured can be currently seen.

On the other hand, knitted fabric is manufactured quickly, is flexible, is of high elasticity and high permeability amount, and does not wrinkle easily; but because of the characteristics of microfibers, the technology of utilizing microfibers in warp-knitted fabric, in particular, which is manufactured faster than weft-knitted fabric, and commercializing it have not been developed compared to woven fabric.

That is, in the case of utilizing, in knitted fabrics, microfibers that have been manufactured by the direct spinning method, many filaments are broken up, and so the warping is very inferior, and the surface texture and writing effect of the surface of the completed product become inferior. And in the case of utilizing, in knitted fabrics, microfibers that have

been manufactured by the bicomponent extraction-type composite spinning method, because the fibers which normally split possess immiscibility, the tension and friction during warping and refining cause the bicomponents to separate, and the warp and knittability deteriorate.

Also, in the case of using, in knitted fabric, yarns that have been manufactured by the bicomponent extraction-type spinning method, not only warp and knittability, but also the appearance of the manufactured warp-knit fabric may be good; however, because the sea component is extracted and microfiberized in the finishing phase, not only is it overly soft, but the tear strength also declines, so there is an incongruous aspect in putting it into practical use.

Technical Task the Invention Seeks to Accomplish

In order to achieve the foregoing objective, the present inventors faced the fact that commercialization is not possible in the case of utilizing microfibers in the field of microfiber warp-knit fabrics because of the variety of flaws occurring during finishing, and, through various researches to overcome such flaws, completed the present invention as follows.

That is, the objective of the present invention lies in providing a method of manufacturing microfiber warp-knit fabric wherein microfibers are utilized for a warp-knit fabric that does not wrinkle easily, that allows great vapor permeability, that is flexible and of good shrinkage, and whose manufacturing speed is fast, thereby complementing good surface texture and excellent appearance.

In order to achieve the foregoing objective, the present invention's method of manufacturing warp-knit fabric is a method of manufacturing warp-knit fabric wherein a warp is knitted to form a warp-knit fabric and undergoes finishing, characterized by blending extraction-type polyester fibers, whose single-fiber fineness can be microfiberized to less than 0.07 denier, with yarns, whose single-fiber fineness is 15-30 denier, and multifilaments, whose single-fiber fineness is 2-3 denier, to knit the warp; and by napping the surface before applying heat of a set temperature and, after pre-setting, extracting said polyester fibers' extract component to finish.

And it is recommended that the blending ratio of said yarns be 5-20% of the weight of the warp-knit fabric finally processed, and the blending ratio of said multifilaments be 15-30% of the weight of the warp-knit fabric finally processed.

Composition and Operation of Invention

Below, the composition and operation of the present invention is explained in detail through concrete embodiments and such.

As above, the present invention's method of manufacturing warp-knit fabric is a method of manufacturing microfiber warp-knit fabric wherein when the warp is knitted, extraction-type polyester fibers, whose single-fiber fineness can be microfiberized to less than 0.07 denier, are blended with yarns, whose single-fiber fineness is 15-30 denier, and multifilaments, whose single-fiber fineness is 2-3 denier; and wherein after the warp-knit fabric is manufactured, finishing is done with the fabric's surface being napped, then pre-set, and after passing through

the weight-reduction process where said extraction-type polyester fibers' extract component is extracted, dyeing, buffing, etc. It is recommended that the blending ratio of said yarns be 5-20% of the weight of the warp-knit fabric finally processed, and the blending ratio of said multifilaments be 15-30% of the weight of the warp-knit fabric finally processed.

In such a manufacturing method, the reason for using extraction-type polyester fibers that can be microfiberized to less than 0.07 denier is that if the microfibers' fineness is thicker than 0.07 denier, the soft surface texture becomes inferior, and it becomes impossible to manifest not only quality, but writing effect as well.

And the reason for blending yarns whose fineness is of 15-30 denier is to endow the warp-knit fabric with drapability. In the case of single-fiber fineness being less than 15 denier, a large quantity needs to be used in order to maintain drapability and this has the unfavorable effect on the soft surface texture that is characteristic of microfibers. In the case of single-fiber fineness exceeding 30 denier, warp, weavability and other such procedural properties deteriorate. The ratio of yarns is limited to 5-20% of the weight of the fabric finally processed because if it is less than 5% of the fabric weight, it would be difficult to exhibit drapability, and if it exceeds 20%, the drapability is overdone, causing the soft surface texture of the microfibers to be attenuated.

In order to enhance the tear strength of the final processed warp-knit fabric, said multifilaments whose single-fiber fineness is 2-3 denier are used, and a blending ratio of 15-30% of the warp-knit fabric finally processed is favorable.

A warp-knit fabric thus knitted with three kinds of thread may be manufactured using several types of knitting machines; as an example, a single-needle, three-guide, three-bar tricot knitting machine may be used.

After napping the surface of a warp-knit fabric thus knitted, it is pre-set at a designated temperature, and after passing through the weigh-reduction process where said extraction-type polyester fibers' extract component is extracted, it undergoes dyeing, buffing, and such of a finishing process until finally setting is done; thus manufacturing a microfiber warp-knit fabric.

Embodiment 1

With polyethylene terephthalate as the island component and polyester copolymer, which has excellent alkali solubility, as the sea component, the sea component is extracted and extraction-use polyester fibers whose ultra-micro-fineness is 0.05 denier are formed. These are used together with tear-strength reinforcement-use multifilaments whose mono-filament is 2.5 denier in fineness at a blending ratio of 29%, and with yarns with a fineness of 20 denier at a blending ratio of 11%. Thus is a warp-knit fabric of 23 C/cm density knitted.

The warp-knit fabric thus manufactured is napped, and after pre-setting under speed conditions of 25 m/min and a temperature of 190°C, reduced by soaking in sodium hydroxide solvent maintaining a temperature of 98°C, passed through dyeing and buffing processing, then finally set under speed conditions of 25 m/min; thus is a microfiber warp-knit fabric manufactured.

Example 1

With polyethylene terephthalate as the island component and polyester copolymer, which has excellent alkali solubility, as the sea component, the sea component is extracted and extraction-use polyester fibers whose ultra-micro-fineness is 0.09 denier are formed. These are used together with tear-strength reinforcement-use multifilaments whose mono-filament is 2.5 denier in fineness at a blending ratio of 29%, and with yarns with a fineness of 20 denier at a blending ratio of 11%. Thus is a warp-knit fabric of 23 C/cm density knitted.

The warp-knit fabric thus manufactured passes through the same finishing process as Embodiment 1 above; thus is a microfiber warp-knit fabric manufactured.

Example 2

With polyethylene terephthalate as the island component and polyester copolymer, which has excellent alkali solubility, as the sea component, the sea component is extracted and extraction-use polyester fibers whose ultra-micro-fineness is 0.05 denier are formed. These are used together with tear-strength reinforcement-use multifilaments whose mono-filament is 2.5 denier in fineness at a blending ratio of 23%, and with yarns with a fineness of 10 denier at a blending ratio of 15%. Thus is a warp-knit fabric of 23 C/cm density knitted.

The warp-knit fabric thus manufactured passes through the same finishing process as Embodiment 1 above; thus is a microfiber warp-knit fabric manufactured.

Example 3

With polyethylene terephthalate as the island component and polyester copolymer, which has excellent alkali solubility, as the sea component, the sea component is extracted and extraction-use polyester fibers whose ultra-micro-fineness is 0.05 denier are formed. These are used together with tear-strength reinforcement-use multifilaments whose mono-filament is 2.5 denier in fineness at a blending ratio of 11%, and with yarns with a fineness of 20 denier at a blending ratio of 35%. Thus is a warp-knit fabric of 23 C/cm density knitted.

The warp-knit fabric thus manufactured passes through the same finishing process as Embodiment 1 above; thus is a microfiber warp-knit fabric manufactured.

The microfiber warp-knit fabrics of the embodiment and examples above were evaluated on the following items, and [the results] are shown in Table 1 below.

1) Softness

Based on the results of sensory inspections by 10 experts, the quality was classified as ⊙ when 8 or more persons judged it soft, △ if 5-7 people judged it soft, and x if 8 or more people judged the softness inferior.

2) Drapability

Based on the results of sensory inspections by 10 experts, the quality was classified as ⊙ when 8 or more persons judged it drapable, △ if 5-7 people judged it drapable, and x if 8 or more people judged the drapability inferior.

3) Writing effect

Based on the results of sensory inspections by 10 experts, the quality was classified as ⊙ when 8 or more persons judged the writing effect present, △ if 5-7 people judged the writing effect present, and x if 8 or more people judged the writing effect inferior.

4) Appearance

Based on the results of sensory inspections by 10 experts, the quality was classified as ⊙ when 8 or more persons judged the appearance favorable, △ if 5-7 people judged the appearance favorable, and x if 8 or more people judged the appearance inferior.

5) Tear Strength

The wale direction's tear strength was measured according to the tongue method specified in JIS L1096.

TABLE 1

Quality Characteristics Comparison of Microfiber Warp-Knit Fabrics

Classification	Softness	Drapability	Writing Effect	Appearance	Tear Strength(kg)
Embodiment 1	⊙	⊙	⊙	⊙	1.5
Example 1	△	⊙	x	△	1.2
Example 2	⊙	x	⊙	△	1.3
Example 3	⊙	△	⊙	△	0.8

According to the results of Table 1 above, it can be found that the microfiber warp-knit fabric of Embodiment 1 manufactured based on the present invention excelled in softness, drapability, writing effect,

appearance and tear strength.

Ramifications of the Invention

As stated above, the present invention's method of manufacturing microfiber warp-knit fabric, by utilizing microfibers in knitted fabrics, enables the manufacture of warp-knit fabric, whereby the manufacturing speed thereof becomes relatively faster than the speed of manufacturing woven textiles, and problems such as the reduction in drapability and in tear strength that occur when microfibers are utilized in the manufacture of knitted fabrics may be resolved. The microfiber warp-knit fabric manufactured according to this manufacturing method possesses the merits, such as vapor permeability, shrinkage and flexibility, of knitted fabrics, while also making possible the acquisition of the characteristic softness, unique appearance and such of microfibers.

(57) Scope of Claims

Claim 1

A method of manufacturing microfiber warp-knit fabric wherein a warp is knitted to form a warp-knit fabric and undergoes finishing, characterized by blending extraction-type polyester fibers, whose single-fiber fineness can be microfiberized to less than 0.07 denier, with yarns,, whose single-fiber fineness is 15-30 denier, and multifilaments, whose single-fiber fineness is 2-3 denier, to knit the warp; and by napping the surface before applying heat of a set temperature and, after pre-setting, extracting said polyester fibers' extract component to finish.

Claim 2

The method of manufacturing microfiber warp-knit fabric according to Claim 1, wherein the blending ratio of said yarn is 5-20% of the weight of the warp-knit fabric finally processed, and the blending ratio of said multifilaments is 15-30% of the weight of the warp-knit fabric finally processed.

PAT-NO: JP409105039A

DOCUMENT-IDENTIFIER: JP 09105039 A

TITLE: POLYESTER WOVEN OR KNITTED FABRIC

PUBN-DATE: April 22, 1997

INVENTOR-INFORMATION:
NAME
SHIMIZU, TOSHIAKI
NABESHIMA, KEITARO
TSUKAMOTO, TETSUO

ASSIGNEE-INFORMATION:
NAME COUNTRY
TORAY IND INC N/A

APPL-NO: JP07261855

APPL-DATE: October 9, 1995

INT-CL (IPC): D02G003/24, D01D005/24 , D01F006/62 , D02G003/38 , D03D015/00
, D03D015/04

ABSTRACT:

PROBLEM TO BE SOLVED: To obtain a soft and dry woven and knitted fabric having mild stretch, stiffness and resilience while having swelling feeling and excellent in lightness.

SOLUTION: This woven or knitted fabric comprises a conjugated yarn 1 in which ultrafine multifilament A comprising ultrafine polyeser semidrawn filament having 0.1-1 denier monofilament fineness is arranged in the periphery of a hollow multifilament B comprising a hollow polyester drawn filament having

3-15 fineness of monofilament. The conjugated yarn 1 is formed so as to disperse a part of the ultrafine multifilament A into a single yarn of a hollow multifilament B.

DERWENT-ACC-NO: 1972-29349T

DERWENT-WEEK: 197219

TITLE: Knitted pile fabric - of polyester pile fibres to form plushes velours simulated fur

PRIORITY-DATA: 1969CA-0048415 (April 11, 1969)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
CA 898540 A		N/A	000	N/A
GB 1354438 A	May 30, 1974	N/A	000	N/A

INT-CL (IPC): D04B001/04

ABSTRACTED-PUB-NO: CA 898540A

BASIC-ABSTRACT:

Single-faced fabric comprises a base yarn and pile-forming fibres of polyester material of 1-15 denier and length three eights to one inch, knitted in with the base yarn and held by its stitches due to transverse compressibility of the pile fibres. Specif., the base yarn is cotton or monofilament polyester, and the pile surface is sheared for setting up as springy non crush velvet, plush or velour, the pile fibres being 1-3 denier and quarter to one inch length.

---------- KWIC ---------

Basic Abstract Text - ABTX (1):

Single-faced fabric comprises a base yarn and pile-forming fibres of polyester material of 1-15 denier and length three eights to one inch, knitted in with the base yarn and held by its stitches due to transverse

compressibility of the pile fibres. Specif., the base yarn is cotton or monofilament polyester, and the pile surface is sheared for setting up as springy non crush velvet, plush or velour, the pile fibres being 1-3 denier and quarter to one inch length.

Derwent Accession Number - NRAN (1):

1972-29349T